

WHAT IS CLAIMED IS:

1. A disk drive comprising:  
a disk medium for perpendicular magnetic recording;  
5 a read head which reads a perpendicular magnetic recorded data signal from the disk medium;  
a preamplifier circuit including a read amplifier which amplifies a read signal output from the read head, and a differentiation circuit which  
10 differentiates a read signal output from the amplifier; and  
a data channel which reproduces data from the read signal output from the preamplifier circuit.
2. The disk drive according to claim 1, wherein  
15 the preamplifier circuit includes an adjusting circuit to adjust low cut-off frequency of the signal output from the read amplifier.
3. The disk drive according to claim 2, wherein  
20 the adjusting circuit comprises a filter circuit which adjusts the low cut-off frequency to 50 kHz or less or in the range of from 1/2000 or less of the maximum recording frequency of the disk medium to a DC level.
4. The disk drive according to claim 1, wherein  
25 the data channel includes a read channel which executes a reproduction signal processing of a longitudinal magnetic recording system to the read

signal, and restores the perpendicular magnetic recorded data onto the disk medium.

5. The disk drive according to claim 1, wherein the preamplifier circuit includes a TA detection circuit to detect occurrence of thermal asperity of the read head from the read signal output from the preamplifier circuit.

10. The disk drive according to claim 1, wherein the preamplifier circuit includes a gain adjusting circuit to adjust a gain of the read signal.

15. The disk drive according to claim 1, wherein the preamplifier circuit includes a selection circuit which selects one of the read signal output from the differentiation circuit and the read signal output from the read amplifier, and sends the selected one to the data channel.

20. A preamplifier device for a disk drive including a disk medium for perpendicular magnetic recording and a read head data from the disk medium, said preamplifier device comprising:

a read amplifier which amplifies a read signal output from the read head;

25. an adjusting circuit which adjusts low cut-off frequency of a read signal output from the read amplifier; and

a differentiation circuit which differentiates the read signal adjusted by the adjusting circuit.

9 The preamplifier device according to claim 8,  
further comprising:

a circuit which sends the read signal output from  
the differentiation circuit to a data channel included  
5 in the disk drive, the data channel restoring  
perpendicular magnetic recorded data onto the disk  
medium.

10. The preamplifier device according to claim 8,  
wherein

10 the adjusting circuit comprises a filter circuit  
which adjust the low cut-off frequency to 50 kHz or  
less or in the range of from 1/2000 or less of the  
maximum recording frequency of the disk medium to a DC  
level.

15 11. The preamplifier device according to claim 8,  
further comprising:

a selection circuit which selects one of the read  
signal output from the differentiation circuit and the  
read signal output from the read amplifier, and sends  
20 the selected one to a data channel included in the  
disk drive.

12. The preamplifier device according to  
claim 11, wherein

25 the selection circuit further comprises a circuit  
which sends the read signal output from the  
differentiation circuit to a data channel included in  
the disk drive, the data channel restoring the

perpendicular magnetic recorded data onto the disk medium.

13. The preamplifier device according to claim 8, wherein

5 the read amplifier comprises a direct current (DC) amplifier circuit, and further comprising; an input circuit to input a bias adjusting signal for adjusting a bias level of the DC amplifier circuit  
10 from the external.

14. The preamplifier device according to claim 11, further comprising:

15 a power controller which shuts down power supply to the differentiation circuit when the read signal output from the differentiation circuit is not selected by the selection circuit.

15. A disk drive comprising:

20 a disk medium for perpendicular magnetic recording; a read head which reads a perpendicular magnetic recorded data signal from the disk medium; a preamplifier circuit including a read amplifier which amplifies a read signal output from the read head, and a differentiation circuit which selectively  
25 differentiates a read signal output from the amplifier; and a TA detection circuit to detect occurrence of

thermal asperity of the read head from the read signal output from the preamplifier circuit without being differentiated by the differentiation circuit.

16. The disk drive according to claim 15, wherein  
5 the TA detection circuit is included in a data channel which restores perpendicular magnetic recorded data from the read signal onto the disk medium.

17. The disk drive according to claim 15, wherein  
10 the disk medium has a servo area wherein servo data is recorded and a user data area wherein user data is recorded,

and further comprising;

15 a selection circuit which outputs the servo data without differentiation processing by the preamplifier circuit while the servo data recorded in the servo area is being read from the read head, and outputs the user data differentiated by the preamplifier circuit while the user data recorded in the user data area is being read from the read head.

20 18. The disk drive according to claim 15, wherein the preamplifier circuit includes a selection circuit which selects one of the read signal output from the differentiation circuit and the read signal output from the read amplifier;

25 the TA detection circuit is included in a data channel which restores the perpendicular magnetic recorded data from the read signal onto the disk

medium;

and further comprising;

a controller which controls the selection circuit to send the read signal output from the differentiation circuit to the data channel at read operation, disables the output of the differentiation circuit at detection operation of the thermal asperity, and sends the read signal output from the read amplifier to the TA detection circuit.

10 19. The disk drive according to claim 18, wherein the controller, when reproducing a servo signal recorded in the servo area of the disk recording medium, controls the selection circuit to send the read signal output from the differentiation circuit to the data channel.

15 20. The disk drive according to claim 18, wherein the controller controls the selection circuit by use of a read gate signal for determining the timing at the read operation and a permit signal for instructing permission for detection operation of the thermal asperity, and controls to enable the output of the differentiation circuit at the read operation, while disable the output of the differentiation circuit at detection operation of the thermal asperity.

25 21. The disk drive according to claim 17, wherein the controller controls the selection circuit by

use of a servo sector pulse for determining the timing of reproduction operation of the servo data and a prohibition signal for instructing prohibition of detection operation of the thermal asperity, and

5 controls to enable the output of the differentiation circuit at reproduction operation of the servo data.

22. The disk drive according to claim 17, wherein  
10 the read head has a GMR element, and configures a magnetic head together with a write head that enables perpendicular magnetic recording;

the preamplifier circuit includes the read amplifier, and a write amplifier to provide a write signal to the write head; and

15 the data channel includes a data decoding circuit which reproduces user data from the read signal output from the preamplifier, a servo demodulation circuit which reproduces servo data from the read signal, and a write data encoding circuit which corresponds to the  
20 write signal.

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